XXII. "On the Brain of a Bushwoman; and on the Brains of two Idiots of European Descent." By JOHN MARSHALL, F.R.S., Surgeon to University College Hospital. Received June 18, 1863.

(Abstract.)

The author having described the mode of preparation and dissection of the three brains, divides his paper into two parts, one relating to the Bushwoman and her brain, and the other to the idiots and their brains.

1. *The Bushwoman's brain.*

The Bushwoman was aged, and about 5 feet high—unusual for her race.

The form of the cranium is a long narrow ovoid—less dolichocephalic, however, than the Negro skull; the face is high-cheeked, and the nose very small and flattened. The frontal sinuses are absent, and the walls of the cranium are thick—so thick that its internal capacity is less than would be expected from its outward form and size, being equal to 35 oz. av. of water, or 60·64 cubic inches, which, for the height of the Bushwoman's body, is decidedly, but not very small.

The actual weight of the preserved encephalon proved to be 21·77 oz. av., which would probably represent, as the author shows, 31·5 oz. for the weight of the recent brain enclosed in its membranes. Allowance being made for the height of the body, this is less by 8·5 oz. than the average weight of the brains of European females of the same age, as estimated from the Tables of Dr. Boyd, published in the Philosophical Transactions for 1861.

The cerebrum proper probably weighed, in its recent state, 27·25 oz., the cerebellum 3·45 oz., and the pons with the medulla oblongata ·8 oz.

The ratio of the cerebrum to the cerebellum was as usual, 7·7 to 1; that of the cerebrum to the body was probably as 1 to 52, and that of the cerebellum to the body as 1 to 418, instead of the usual ratios of 1 to 41, and 1 to 328.

An examination of the general form of the cerebrum shows that it is small, but long—defective in width, and especially in height. Its outlines and surfaces are angular and flat instead of rounded and

full. The frontal region is very narrow, shallow, much excavated below, and compressed laterally near the entrance of the Sylvian fissure. The parietal region is low, but prominent laterally; the occipital region is long, but defective in height; and the temporal region is long, but narrow.

The cerebrum overlaps the cerebellum by ·5 inch, which is as great an absolute overlap as is usual in European brains, but less relatively to the length of the brain, which is very long in the Bushwoman.

The fissures, lobes, and convolutions are then described at length, and compared with those of the ordinary European brain, with those of the Hottentot Venus's brain figured by Gratiolet, and with those of the young Chimpanzee. It is impossible to give in an abstract even an outline of the facts recorded in this part of the paper.

The general result of the inquiry is to show that the fissures are rather more complex than in the brain of the Hottentot Venus, but much less so than in the European. They are rather more complex on the left than on the right side of the brain. They are widely separated from those of the Ape's brain.

The author concludes—1. That all the convolutions proper to man are present, but, as compared with the European brain, are much more simple, and less marked with secondary sulci. The greatest deficiency is in the occipital and orbital convolutions.

2. That the convolutions, taken generally, are rather more complex than those represented in Gratiolet's figure of the Hottentot Venus's brain, which may be partly due to the obliteration of details in the latter during its long period of preservation.

3 & 4. That the resemblance between the Bushwoman's brain and the Hottentot Venus's brain is sufficient to justify the conclusion that the latter was not an idiot, or a defectively developed individual; but both brains, as compared with the European, have an infantile simplicity, characteristic partly of sex, but chiefly of race.

5. That the convolutions being more simple, can be more easily traced and compared on the two sides than usual, but still show abundant evidences of the asymmetry characteristic of man.

6. That there is a greater difference between the Bushwoman's cerebrum and the highest Ape's cerebrum than between it and the European cerebrum; but a less specific difference between it and the

European than between the Chimpanzee and the Orang; and, of course, much less than between the highest and lowest Quadrumanous brains. There is, however, less difference between the Bushwoman and the highest Ape than between the latter and the lowest Quadrumanous animal.

7. The general results, the author thinks, justify the expectation that characteristic differences of degree of cerebral development may hereafter be found in the several leading races of mankind.

The author then proceeds to describe the colour and relative proportions of the grey and white substance, the commissures, ventricles, and ganglionic masses.

The commissural fibres of the corpus callosum are very deficient in the Bushwoman; and the other commissures are also small. The body and anterior cornu of the lateral ventricle are also small; but the posterior cornu and its contained parts are very large.

In the cerebellum, the median parts appear to be somewhat less developed than the hemispheres. Its transverse commissural fibres are more largely developed than the same system of fibres in the European brain; the Chimpanzee standing, in this respect, still lower. The laminæ of the cerebellum are even more numerous than in the European specimen with which the Bushwoman's brain was compared. The cerebellum seems to be more perfectly developed than the cerebrum.

2. *The Idiots' brains.*

Some account is first given of the age, height, and bodily and mental condition of these idiots, one of whom was a woman, aged forty-two years, and the other a boy of twelve. The former was able to walk, though badly, to nurse a doll, and to say a few words; whilst the latter could not walk, nor handle anything, nor articulate a single word.

In the idiot woman, the weight of the recent encephalon was 10 oz. 5 grs., of which the cerebrum weighed 7·6 oz., the cerebellum 1·95 oz., and the pons with the medulla oblongata ·42 oz. In the idiot boy, the recent encephalon weighed 8·5 oz., the cerebrum 5·85 oz., the cerebellum 2·25 oz., and the pons with the medulla oblongata ·4 oz. These are the two smallest idiots' brains the weights of which have been recorded.

Calculations are then entered upon by the author to show the pro-

bable ratios, in the two cases, of the weight of the encephalon, the cerebrum, and the cerebellum to that of the body, and of the relative weight of the cerebrum to the cerebellum. The result of this inquiry is to prove that the entire encephalon was, in each case, about one-fourth of its normal proportional weight. The cerebrum was much more defective than the cerebellum. The idiot boy had relatively more cerebellum, and the idiot woman more cerebrum.

On studying the general form, dimensions, and relative position of the parts of the encephalon, it appears that the entire brain in the idiot woman resembled very closely, at first sight, both in its general mass and in the form of its anterior part, the brain of the Chimpanzee; but a closer comparison shows great differences. The cerebellum especially is of very great size, forming about one-fourth of the entire mass, and, instead of being covered by the cerebrum, has about ·35 inch of it exposed posteriorly.

A detailed description is then given of the fissures, lobes, and convolutions, which are compared with those of the healthy brain and with those of the Chimpanzee. Only the most general conclusions arrived at can here be given.

Of the lobes, the temporal are remarkably large; the parietal seem to be next highly developed; whilst the occipital and frontal are the smallest. According to the author—

1. The idiots' cerebra are not merely diminutive organs, having all the proper parts on a smaller scale, but these parts are fewer in number, less complex, and different in relative proportion and position.

2. Nevertheless all the primary and connecting convolutions proper to the human cerebrum are represented in the idiots, but are very remarkably simplified.

3. The degree to which the convolutions of those parts are developed follows the order observed in the lobes themselves.

4. The convolutions of the idiot woman are more developed than those of the idiot boy, except those of the parietal region.

5. The peculiarities in the idiots' cerebra are due to arrest of development occurring at some period of fœtal existence.

6. Judging from external appearances generally, it might be supposed that this period was about the latter half of the seventh month, and somewhat earlier in the boy than in the woman. But a closer

examination shows that the malformation is not due to a simple arrest occurring so late in fœtal life, but commences much earlier in the parts at the base of the cerebrum, and then influences the evolution of the superficial parts of the hemispheres. The corpora striata appear to be specially affected, and through these the whole hemispheres, but the frontal lobe especially. The interest of this observation in a general physiological view, and especially in regard to the mental condition of idiots, is pointed out.

7. It is not certain whether the idiots' brains had undergone any local evolutional change as the result of education or training.

8. It is certain that they had increased somewhat in size after the general cessation of evolutional changes in their form.

9. The idiots' brains differ—the woman's being more developed on the whole, especially in the temporal regions. Her mental powers were also greater.

10. These idiot brains are somewhat less developed than the two microcephalic cerebra figured by Leuret and Gratiolet.

11. The convolutions in the idiots' brains are more simple than those of the higher Apes, and approach, in this respect, those of still lower Quadrumana. But the points of difference between the idiots' brains and those of the Quadrumana are very decided. They are human cerebra, although so imperfectly developed. They show a general conformity to the cerebral plan of the Primates generally; but already they manifest special human characters.

In regard to the internal structure of the cerebrum and cerebellum, many facts are noticed. The commissural fibres of the corpus callosum are very imperfectly developed. The lateral ventricles and their contents generally are fairly developed; but the corpora striata are very small. The cerebellum is well developed in all its parts in both idiots, but is not perfectly so in either. It is larger in the idiot boy; but the transverse commissural fibres are much less developed in him than in the woman. In accordance with Malacarne's statements, the laminæ are fewer in number in both idiots' brains than in the perfect brain. The cerebellum is not merely larger, but much more developed in its form than the cerebrum, and it certainly continued to be developed to a much later period.

In a postscript-note, dated August 6th, 1863, the author gives an

account of the examination of two idiots' brains preserved in the museum of St. Bartholomew's Hospital, and also of a series of wax models of fœtal brains in the museum of Guy's Hospital.

The result of the additional information so obtained is entirely to confirm the descriptions and explanations given of the structure and mode of formation of the idiot brain.

XXIII. "On Fermat's Theorem of the Polygonal Numbers." By the Right Hon. Sir Frederick Pollock, F.R.S., Lord Chief Baron. Received June 18, 1863.

[An abstract will be given in a future Number.]

Communications received since the end of the session.

I. "On Mauve or Aniline-Purple." By W. H. Perkin, Esq., F.C.S. Communicated by J. Stenhouse, LL.D., F.R.S. Received August 19, 1863.

(Abstract.)

The discovery of this colouring matter in 1856, and its introduction as a commercial article, have originated that remarkable series of compounds known as Coal-tar colours, which have now become so numerous, and, in consequence of their adaptability to the arts and manufactures, are of such great and increasing importance. The chemistry of mauve may appear to have been rather neglected, its composition not having been established, although it has formed the subject of several papers by continental chemists. Its chemical nature also has not been generally understood; and it is to this fact that many of the discrepancies between the results of the different experimentalists who have worked on this subject are to be attributed.

On adding a solution of hydrate of potassium to a boiling solution of commercial crystallized mauve, it immediately changes in colour from purple to a blue violet, and, on standing, deposits a crystalline body, which, after being washed with alcohol and then with water, presents itself as a nearly black glistening body, not unlike pulverized specular iron ore.

This substance is a base which I propose to call *Mauveine*: it